SECTION 1: THE PRODUCT DEFINITION SECTION (PDS).

The PDS contains indicators for the Parameter table Version, the originating center, the numerical model (or "generating process") that created the data, the geographical area covered by the data, the parameter itself, the values for the appropriate vertical level or layer where the data reside, the decimal scale factor, and date/time information. The PDS is normally 28 octets long but it may be longer if an originating center chooses to make it so. Users of GRIB messages are strongly urged to use the length-of-section portion of the PDS to determine where the next section begins. Never assume a fixed octet length in this, or any other, section.

Octet no.	PDS Content	
1 - 3	Length in octets of the Product Definition Section	
4	Parameter Table Version number, currently 3 for international exchange. (Parameter table version numbers 128-254 are reserved for local use.)	
5	Identification of center (See Table 0)	
6	Generating process ID number (allocated by the originating center; See Table A)	
7	Grid Identification (geographical location and area, defined by the originating center; See Table B)	
8	Flag specifying the presence or absence of a GDS or a BMS (See Table 1)	
9	Indicator of parameter and units (See Table 2)	
10	Indicator of type of level or layer (See Tables 3 & 3a)	
11-12	Height, pressure, etc. of the level or layer (See Table 3)	
13	Year of century	\ Initial (or Reference) | time of forecast - UTC
14	Month of year	| | or
15	Day of month	> | Start of time period
16	Hour of day	| for averaging or | accumulation of
17	Minute of hour	/ analyses

Octet no. PDS Content (cont.)

18	Forecast time unit (see Table 4)
19	P1 - Period of time (Number of time units) (0 for analysis or initialized analysis.) Units of time given by content of octet 18
20	P2 - Period of time (Number of time units) or Time interval between successive analyses, successive initialized analyses, or forecasts, undergoing averaging or accumulation. Units given by octet 18.
21	Time range indicator (See Table 5)
22-23	Number included in average, when octet 21 (Table 5) indicates an average or accumulation; otherwise set to zero.
24	Number Missing from averages or accumulations.
25	Century of Initial (Reference) time (=20 until Jan. 1, 2001)
26	Identification of sub-center (allocated by the originating center; See Table C)
27-28	The decimal scale factor D A negative value is indicated by setting the high order bit (bit No. 1) in octet 27 to 1 (on).
29-40	Reserved (need not be present)
41-...	Reserved for originating center use.

Note (1): Octet 8 may indicate the presence of the Grid Description Section (GDS) even though octet 7 specifies a predefined grid. In this case the GDS must describe that grid - this device serves as a mechanism for transmitting new "predefined" grids to users prior to their formal publication in this or the official WMO documentation. It is, however, the desired practice to always include the GDS in GRIB bulletins.

Note (2): The use of octet 26 to indicate a "sub-center" is now an officially sanctioned WMO practice. The use arises out of a recent change in the Manual in which the "originating center" for both GRIB and BUFR (FM 94) reference a single common table (WMO No. 306, Part C, Table C-1). The WMO will coordinate the assignment of the originating center numbers for national and international centers for both GRIB and BUFR, while each national center will then be free to assign sub-center numbers at will to be placed in the octet 26 of the GRIB PDS (or Octet 5 of BUFR Section 1). A zero value in octet 26 will serve as the default indicating that there is no sub-center associated with a particular center. Table 0, in this document, shows, in Part 1, the WMO recognized originating centers as would be found in octet 5, and, additionally, in Part 2, sub-center numbers allocated by NCEP.

Note (3): The NCEP Central Operations' (NCO) entries in the local use sections of Tables 2 and 6, as well as all NCO-defined tables, are specified in this Office Note.

TABLES FOR THE PDS
TABLE 0

NATIONAL/INTERNATIONAL
ORIGINATING CENTERS
(Assigned By The WMO)
(PDS Octet 5)

VALUE	CENTER
01	Melbourne (WMC)
02	Melbourne (WMC)
04	Moscow (WMC)
05	Moscow (WMC)
07	US National Weather Service - NCEP (WMC)
08	US National Weather Service - NWSTG (WMC)
09	US National Weather Service - Other (WMC)
10	Cairo (RSMC/RAFC)
12	Dakar (RSMC/RAFC)
14	Nairobi (RSMC/RAFC)
16	Atananarivo (RSMC)
18	Tunis-Casablanca (RSMC)
20	Las Palmas (RAFC)
21	Algiers (RSMC)
22	Lagos (RSMC)
26	Khabarovsk (RSMC)
28	New Delhi (RSMC/RAFC)
30	Novosibirsk (RSMC)
32	Tashkent (RSMC)
33	Jeddah (RSMC)
34	Japanese Meteorological Agency - Tokyo (RSMC)
36	Bankok
37	Ulan Bator
38	Beijing (RSMC)
40	Seoul
41	Buenos Aires (RSMC/RAFC)
43	Brasilia (RSMC/RAFC)
45	Santiago
46	Brasilian Space Agency - INPE
51	Miami (RSMC/RAFC)
52	National Hurricane Center, Miami
53	Canadian Meteorological Service - Montreal (RSMC)
55	San Francisco

57	U.S. Air Force - Global Weather Center
58	US Navy - Fleet Numerical Oceanography Center
59	NOAA Forecast Systems Lab, Boulder CO
60	National Center for Atmospheric Research (NCAR), Boulder, CO
64	Honolulu
65	Darwin (RSMC)
67	Melbourne (RSMC)
69	Wellington (RSMC/RAFC)
74	U.K. Met Office - Bracknell
76	Moscow (RSMC/RAFC)
78	Offenbach (RSMC)
80	Rome (RSMC)
82	Norrkoping
85	French Weather Service - Toulouse
86	Helsinki
87	Belgrade
88	Oslo
89	Prague
90	Episkopi
91	Ankara
92	Frankfurt/Main (RAFC)
93	London (WAFC)
94	Copenhagen
95	Rota
96	Athens
97	European Space Agency (ESA)
98	European Center for Medium-Range Weather Forecasts - Reading
99	DeBilt, Netherlands

Note: WMC - World Meteorological Center
RSMC - Regional Specialized Meteorological Center
WAFC - World Area Forecast Center
RAFC - Regional Area Forecast Center

TABLE A. Generating Process or Model
from Originating Center 7 (USNWS NCEP)
(PDS Octet 6)

VALUE	MODEL
02	Ultra Violet Index Model
05	Satellite Derived Precipitation and temperatures, from IR (See PDS Octet 41... for specific satellite ID)
10	Global Wind-Wave Forecast Model
19	Limited-area Fine Mesh (LFM) analysis
25	Snow Cover Analysis
30	Forecaster generated field
31	Value added post processed field
39	Nested Grid forecast Model (NGM)
42	Global Optimum Interpolation Analysis (GOI) from "Aviation" run
43	Global Optimum Interpolation Analysis (GOI) from "Final" run
44	Sea Surface Temperature Analysis
45	Coastal Ocean Circulation Model
49	Ozone Analysis from TIROS Observations
52	Ozone Analysis from Nimbus 7 Observations
53	LFM-Fourth Order Forecast Model
64	Regional Optimum Interpolation Analysis (ROI)
68	80 wave triangular, 18-layer Spectral model from "Aviation" run
69	80 wave triangular, 18 layer Spectral model from "Medium Range Forecast" run
70	Quasi-Lagrangian Hurricane Model (QLM)
73	Fog Forecast model - Ocean Prod. Center
74	Gulf of Mexico Wind/Wave
75	Gulf of Alaska Wind/Wave
76	Bias corrected Medium Range Forecast
77	126 wave triangular, 28 layer Spectral model from "Aviation" run
78	126 wave triangular, 28 layer Spectral model from "Medium Range Forecast" run
79	Backup from the previous run
80	62 wave triangular, 28 layer Spectral model from "Medium Range Forecast" run
81	Spectral Statistical Interpolation (SSI) analysis from "Aviation" run.

82	Spectral Statistical Interpolation (SSI) analysis from "Final" run.
83	MESO ETA Model - Backup Version (currently 80 km)
84	MESO ETA Model (currently 32 km)
85	No longer used
86	RUC Model, from Forecast Systems Lab (isentropic; scale: 60km at 40N)
87	CAC Ensemble Forecasts from Spectral (ENSMB)
88	Ocean Wave model with additional physics (PWAV)
90	62 wave triangular, 28 layer spectral model extension of the “Medium Range Forecast” run
91	62 wave triangular, 28 layer spectral model extension of the “Aviation” run
92	62 wave triangular, 28 layer spectral model run from the “Medium Range Forecast” final analysis
93	62 wave triangular, 28 layer spectral model run from the T62 GDAS analysis of the “Medium Range Forecast” run
94	T170/L42 Global Spectral Model from MRF Run
95	T126/L42 Global Spectral Model from MRF Run
96	Aviation Model (currently T170/L42 Global Spectral Model)
100	RUC Surface Analysis (scale: 60km at 40N)
101	RUC Surface Analysis (scale: 40km at 40N)
105	RUC Model from FSL (isentropic; scale: 40km at 40N)
110	ETA Model - 15km version
150	NWS River Forecast System (NWSRFS)
151	NWS Flash Flood Guidance System (NWSFFGS)
152	WSR-88D Stage II Precipitation Analysis
153	WSR-88D Stage III Precipitation Analysis

TABLE B. GRID IDENTIFICATION
(PDS Octet 7)
MASTER LIST OF NCEP STORAGE GRIDS

VALUE	GRID	GRID INCREMENT
1	1679-point (73x23) Mercator grid with (1,1) at (0W,48.09S), (73,23) at (0W, 48.09N); I increasing eastward, Equator at J=12.	5 degs of Longitude
2	10512-point (144x73) global longitude-latitude grid. (1,1) at (0E, 90N), matrix layout. N.B.: prime meridian not duplicated.	2.5 deg
3	65160-point (360x181) global longitude-latitude grid. (1,1) at (0E, 90N), matrix layout. N.B.: prime meridian not duplicated.	1.0 deg
4	259920-point (720x361) global lon/lat grid. (1,1) at (0E, 90N); matrix layout; prime meridian not duplicated	0.5 deg
5	3021-point (53x57) N. Hemisphere polar stereographic grid oriented 105W; Pole at (27,49). (LFM analysis)	190.5 km at 60N
6	2385-point (53x45) N. Hemisphere polar stereographic grid oriented 105W; Pole at (27,49). (LFM Forecast)	190.5 km at 60N
~~8~~	~~5104-point (116x44) Mercator grid with (1.1) at (3.1035E,48.67S) and (116,44) At (0.000W,61.05N); I increasing eastward, Equator at j=19.~~	~~3.105 degs of longitude~~
21-26	International Exchange and Family of Services (FOS) grids - see below	
27	4225-point (65x65) N. Hemisphere polar stereographic grid oriented 80W; Pole at (33,33).	381 km at 60N
28	4225-point (65x65) S. Hemisphere polar stereographic grid oriented 100E;	381 km at 60S

Table B: GRIDS (cont.)

	Pole at (33,33).	
29	5365-point (145x37) N. Hemisphere longitude/latitude grid for latitudes 0N to 90N; (1,1) at (0E,0N).	2.5 degs
30	5365-point (145x37) S. Hemisphere longitude/latitude grid for latitudes 90S to 0S; (1,1) at (0E,90S).	2.5 degs
33	8326-point (181x46) N. Hemisphere longitude/latitude grid for latitudes 0N to 90N; (1,1) at (0E,0N).	2 degs
34	8326-point (181x46) S. Hemisphere longitude/latitude grid for latitudes 90S to 0S; (1,1) at (0E,90S).	2 degs
37 - 44	Eight lat-long 1.25x1.25 "thinned" grids, covering the globe by octants of 3447 points. Full GRIB specifications below. For WAFS, ICAO, Family of Services (FOS), and International exchange.	
45	Global latitude/longitude 1.25 deg Resolution See full GRIB specifications below.	
50	Family of Services "regional grid" - see below.	
53	5967-point (117x51) Mercator grid with (1,1) at (0.000W,61.05S) and (117,51) At (0.000W,61.05N); I increasing eastward, Equator at j=26.	3.105 degs of longitude
55	6177-point (87x71) N. Hemisphere polar stereographic grid oriented 105W; Pole at (44,38). (2/3 bedient NH sfc anl)	254 km at 60N
56	6177-point (87x71) N. Hemisphere polar stereographic grid oriented 105W; Pole at (40,73). (1/3 bedient NA sfc anl)	127 km at 60N
61-64	International Exchange & FOS grids - see below.	
75	12321-point (111x111) N. Hemisphere Lambert Conformal grid. No fixed location; used by QLM Hurricane model.	40 km at 30&60 deg N
76	12321-point (111x111) S. Hemisphere Lambert Conformal grid. No fixed location; used by QLM Hurricane model.	40 km at 30&60 deg S

77	12321-point (111x111) N. Hemisphere Mercator grid. No fixed location; used by QLM Hurricane model.	40 km at 22.5 deg N&S
85	32400-point (360x90) N. Hemisphere longitude/latitude grid; longitudes: 0.5E to 359.5E (0.5W); latitudes: 0.5N to 89.5N; origin (1,1) at (0.5E,0.5N)	1 deg
86	32400-point (360x90) S. Hemisphere longitude/latitude grid; longitudes: 0.5E to 359.5E (0.5W); latitudes: 89.5S to 0.5S; origin (1,1) at (0.5E,89.5S)	1 deg
87	5022 point (81x62) N. Hemisphere polar stereographic grid oriented at 105W. Pole at (31.91, 112.53) Used for RUC. (60 km at 40N). See below for GRIB specification.	68.153 km at 60N
90	12902 point (92x141 semi-staggered) lat. long., rotated such that center located at 52.0N, 111.0W; LL at 37.5W, 35S Unfilled E grid for 80 km ETA model	lat.14/26 deg lon.15/26 deg
91	25803 point (183x141) lat. long., rotated such that center located at 52.0N, 111.0W; LL at 37.5W,35S Filled E grid for 80 km ETA model	lat.14/26 deg lon.15/26 deg
92	81213 point (222x365) lat. long., rotated such that center located at 50.0N, 107.0W; LL at 49.3333W, 37.3333S. Unfilled E grid for 32 km ETA model	lat. 8/39 deg lon. 2/9 deg
93	162425 point (445x365) lat. long., rotated such that center located at 50.0N, 107.0W; LL at 49.3333W, 37.3333S Filled E grid for 32 km ETA model	lat. 8/39 deg lon. 2/9 deg
94	48916-point Arakawa semi-staggered E-grid on rotated latitude/longitude grid	7/36 deg long, 5/27 deg lat
95	97831-point Arakawa filled E-grid on	7/36 deg long,

	rotated latitude/longitude grid	5/27 deg lat
96	41630-point Arakawa semi-staggered E-grid on rotated latitude/longitude grid	1/3 deg long, 4/13 deg lat
97	83259-point Arakawa filled E-grid on rotated latitude/longitude grid	1/3 deg long, 4/13 deg lat
98	Global Gaussian T62 grid. See GRIB specifications below	
100	6889-point (83x83) N. Hemisphere polar stereographic grid oriented 105W; Pole at (40.5,88.5). (NGM Original C-Grid)	91.452 km at 60N
101	10283-point (113x91) N. Hemisphere polar stereographic grid oriented 105W; Pole at (58.5,92.5). (NGM "Big C-Grid")	91.452 km at 60N
103	3640-point (65x56) N. Hemisphere polar stereographic grid oriented 105W; Pole at (25.5,84.5) (used by ARL)	91.452 km at 60N
104	16170-point (147x110) N. Hemisphere polar stereographic grid oriented 105W; pole at (75.5,109.5). (NGM Super C grid)	90.75464 km at 60N
105	6889-point (83x83) N. Hemisphere polar stereographic grid oriented 105W; pole at (40.5,88.5). (U.S. area subset of NGM Super C grid, used by ETA model)	90.75464 km at 60N
106	19305 point (165x117) N. Hemisphere polar stereographic grid oriented 105W; pole at (80,176) Hi res. ETA (2 x resolution of Super C)	45.37732 km at 60N
107	11040 point (120x92) N. Hemisphere polar stereographic grid oriented 105W; pole at (46,167) subset of Hi res. ETA; for ETA & MAPS/RUC	45.37 732 km at 60N
126	Global Gaussian T126 grid. See GRIB specifications below	
201-235	AWIPS grids. See specifications below.	
255	(non-defined grid - specified in the GDS)	

NOTE ON NCEP STORAGE GRIDS:

On the polar stereographic grids, the vector wind is resolved into u and v components with respect to the grid coordinates, i.e., u represents motion in the direction of increasing x (i) coordinate, v in the direction of increasing y (j). On the latitude-longitude grids, u and v are true eastward and northward components, respectively. However, take note of Table 7, below, which allows for the specification of other possibilities when the Grid Description Section is included in the message.

INTERNATIONAL EXCHANGE AND FAMILY OF SERVICES (FOS) GRIDS

VALUE	RESOLUTION (degrees) lon x lat	AREA COVERAGE (degrees)	GRID SHAPE cols	GRID SHAPE rows	GRID POINTS
21	5.0 x 2.5	0-180E, 0-90N	37	36 + pole	1333
22	5.0 x 2.5	180W-0, 0-90N	37	36 + pole	1333
23	5.0 x 2.5	0-180E, 90S-0	pole + 37	36	1333
24	5.0 x 2.5	180W-0, 90S-0	pole + 37	36	1333
25	5.0 x 5.0	0-355E, 0-90N	72	18 + pole	1297
26	5.0 x 5.0	0-355E, 90S-0	pole + 72	18	1297
50	2.5 x 1.25	(see note iv)			964
61	2.0 x 2.0	0-180E, 0-90N	91	45 + pole	4096
62	2.0 x 2.0	180W-0, 0-90N	91	45 + pole	4096
63	2.0 x 2.0	0-180E, 90S-0	pole + 91	45	4096
64	2.0 x 2.0	180W-0, 90S-0	pole + 91	45	4096
255	(non-standard grid - defined in the GDS)				

NOTES ON INTERNATIONAL EXCHANGE/FOS GRIDS:

(i) The grid points are laid out in a linear array such that the longitude index (the columns) is the most rapidly varying. For the northern hemisphere grids the first point in the record is at the intersection of the western-most meridian and southern-most circle of latitude; the last point is the single polar value (see note iii, below). For the southern hemisphere grids the first point in the record is the single polar value (see note iii, below); the last point is at the intersection of the eastern-most meridian and northern-most circle of latitude. For those familiar with FORTRAN subscripting conventions, longitude is the first subscript, latitude the second.

(ii) In grids 21 through 26, and 61 through 64, the values on the shared boundaries are included in each area.

(iii) The datum for the pole point is given only once in each grid. The user must expand, if desired, the single pole point value to all the pole "points" at the pole row of a latitude-longitude grid. Scalar quantity values are the same for all pole points on a the grid. Wind components at the poles are given by the formulae:

$$u = -speed * \sin(dd) \quad \& \quad v = -speed * \cos(dd)$$

where dd is the direction of the wind as reported according to the specification of wind direction at the poles (refer to WMO Manual on Codes, code table 878).

The WMO convention can be given this operational definition: At the North Pole, face into the wind and report the value of the west longitude meridian along which the wind is coming at you; at the South Pole do likewise but report the east longitude meridian value. This is equivalent to placing the origin of a right-handed Cartesian coordinate system on the North Pole with the y-axis pointing to the prime (0 degree) meridian and the x-axis pointing to the 90 degrees west meridian, and then resolving any vector wind at the pole point into components along those axes. At the South Pole the coordinate axes are oriented such that the y-axis points toward 180 degrees west. Those components are the u- and v-values given as the single pair of pole point winds in the GRIB format.

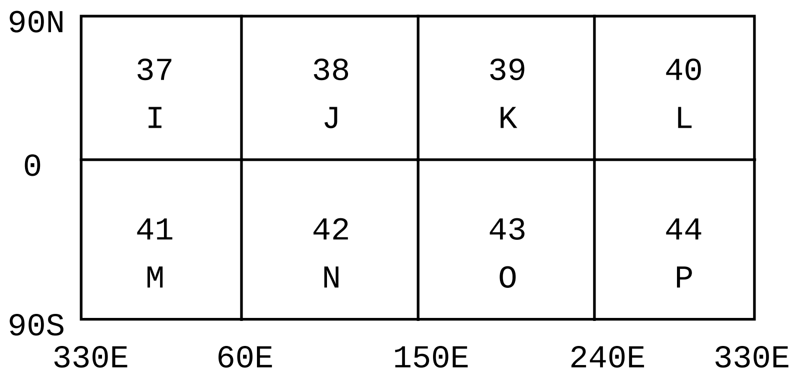
In terms of a longitude/latitude grid these are the wind components for the pole point at the 180 degree meridian. For example, on a 2.5x2.5 degree northern hemisphere grid (145x37 points), with the abscissa along the equator and the ordinate along the prime meridian, the transmitted north pole wind components are those that belong at the gridpoint (73,37). The wind components at the other grid points along the pole row may be obtained through suitable rotation of the coordinate system. All the components at the pole row are, of course, simply representations of the same vector wind viewed from differing (rotated) coordinate systems. In the southern hemisphere the analogous situation holds; the single set of transmitted pole point wind components belong at the gridpoint (73,1).

(iv) Grid 50 is a set of points over the contiguous United States and environs on a grid extending from 20N (row No. 1) to 60N (row No. 33) in 1.25 degree intervals. The grid increases in longitudinal extent from south to north in the following manner:

ROWS	NO. POINTS	LONGITUDINAL EXTENT
1-4	22	122.5W - 70.0W
5-8	24	125.0W - 67.5W
9-12	26	127.5W - 65.0W
13-16	28	130.0W - 62.5W
17-20	30	132.5W - 60.0W
21-24	32	135.0W - 57.5W
25-28	34	137.5W - 55.0W
29-33	36	140.0W - 52.5W

WAFS/ICAO/INTERNATIONAL EXCHANGE/FOS GRIDS

(Grids 37 - 44)



Global Coverage of Grids
Octants of the Globe

In the figure the coordinates indicate the location of the octants of the globe, the numbers are the corresponding grid identification numbers (PDS Octet 7), and the letters are the grid identification used in the WMO heading (see Appendix A).

The left and right meridional columns of each octant/grid are shared with the neighbors.

The basic grid point separation is 1.25x1.25 deg. on a latitude/longitude array, but the grid is "thinned" by reducing the number of points in each row as one goes northward (or southward) away from the equator. In GRIB terms, this is referred to as a "quasi-regular" grid.

The latitudinal increment is always 1.25 deg.; this results in 73 rows where the pole is included as a "row", not a single gridpoint.

The longitudinal spacing at the equator is also 1.25 deg.; thus there will be 73 gridpoints at the equator in each octant.

The number of points on each latitudinal row, other than the equator, is given by (using FORTRAN notation):

NPOINTS = IFIX(2.0 + (90.0/1.25) * COS(LATITUDE))

Thus at the pole there will be two gridpoints, one each at the meridians that delineate the edges of the octant. The formula was worked out so that there is (approximately) equal geographic separation between the grid points uniformly across the globe.

Because of variations in precision and roundoff error in different computers, the value of NPOINTS may vary by 1 at "critical" latitudes when calculated on various hardware platforms. Here is a table of the exact values of NPOINTS as a function of latitude as used in the internationally exchanged grids. These numbers will, of course, be found in the Grid Description Section of each GRIB bulletin.

Latitude Range inclusive (north or south)	NPOINTS	inclusive (north or south)	
		55.00	43
0.00 - 8.75	73	56.25	42
10.00 - 12.50	72	57.50	40
13.75 - 16.25	71	58.75	39
17.50 - 18.75	70	60.00	38
20.00 - 21.25	69	61.25	36
22.50	68	62.50	35
23.75 - 25.00	67	63.75	33
26.25	66	65.00	32
27.50 - 28.75	65	66.25	30
30.00	64	67.50	29
31.25	63	68.75	28
32.50	62	70.00	26
33.75	61	71.25	25
35.00 - 36.25	60	72.50	23
37.50	59	73.75	22
38.75	58	75.00	20
40.00	57	76.25	19
41.25	56	77.50	17
42.50	55	78.75	16
43.75	54	80.00	14
45.00	52	81.25	12
46.25	51	82.50	11
47.50	50	83.75	9
48.75	49	85.00	8
50.00	48	86.25	6
51.25	47	87.50	5
52.50	45	88.75	3
53.75	44	90.00	2

Latitude Range NPOINTS

When all this is put together the result is that there are 3447 points of data actually transmitted in any individual GRIB bulletin containing one octant of the globe.

Table B: GRIDS (cont.)

In the GRIB bulletins all of this information will be included in the Grid Description Section (GDS); the GDS must be included in order to describe the thinned or "quasi-regular" grid structure. See Section 2 and Table C for the general description of the GDS; what follows are the specific values of the variables in the GDS that describe these eight grids.

GDS Contents

Octets	Value or variable
1-3	178 (length of GDS)
4	0 (or 255, either indicating no PV)
5	33 (pointer to start of PL list)
6	0
7-32	Grid description - see below
33-178	number of points in each of 73 rows (2 octets per point)

Details of Octets 7-32 - Grid Description

Octets	Variable & Value
7-8	Ni = all bits set to 1 (missing)
9-10	Nj = 73

	GRID:	37	38	39	40	41	42	43	44
11-13	La1 =	0	0	0	0	90S	90S	90S	90S
14-16	Lo1 =	330	60	150	240	330	60	150	240

17 Resolution & Component Flag = [10000000] (binary)

	GRID:	37	38	39	40	41	42	43	44
18-20	La2 =	90N	90N	90N	90N	0	0	0	0
21-23	Lo2 =	60	150	240	330	60	150	240	330

24-25 Di = all bits set to 1 (missing)

26-27	Dj = 1.25 deg
28	Scan Mode = [01000000] (binary)
29-32	Set to 0 (unused)

Note that the scanning direction is from the bottom (south edge) to the top of the octant grids, regardless of the hemisphere. Thus in the northern hemisphere the first 73 data points (in the BDS) will be the equatorial values and the last two will be the polar values. The PL counts in the GDS octets 33-178 will, of course, indicate contain these numbers.

In the southern hemisphere, the first two data points will be the south pole values, and the last 73 points will be the equatorial values. Octets 33-34 in the GDS will contain "2", octets 35-36 will contain a "3", and so on to octets 177-178 which will contain "73".

SELECTED NCEP GRIDS DEFINED USING GRIB SPECIFICATIONS
(See Table C, in Section 2, for definition of symbols)

VALUE — GRID DESCRIPTIONS

1 — Tropical Strip
(Mercator)

Ni = 73
Nj = 23
La1 = 48.09S
Lo1 = 0.0E
Res. & Comp. flag = 1 0 0 0 0 0 0 0
La2 = 48.09N
Lo2 = 0.0W
Latin = 22.5
Scanning Mode (Bits 1 2 3) = 0 1 0
Di = Dj = 513.669 km

The longitudinal grid spacing is 5.00 degrees.

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3 — Global Latitude/Longitude 1 deg Resolution

Ni = 360
Nj = 181
La1 = 90.000N
Lo1 = 0.0E
Res. & Comp. flag = 1 0 0 0 0 0 0 0
La2 = 90.000S
Lo2 = 359.000E = 1.000W
Di = 1.000 degrees
Dj = 1.000 degrees
Scanning Mode = 00000000(NB: matrix style)

45	Global Latitude/Longitude 1.25 deg Resolution

Ni = 288 (prime meridian not duplicated)
Nj = 145
La1 = 90.000N
Lo1 = 0.0E
Res. & Comp. flag = 1 0 0 0 0 0 0 0
La2 = 90.000S
Lo2 = 358.750E = 1.250W
Di = 1.250 degrees
Dj = 1.250 degrees
Scanning Mode = 00000000
(NB: matrix style)

87	U.S. Area; used in MAPS/RUC (60km at 40N) (N. Hem. polar stereographic)

Nx = 81
Ny = 62
La1 = 22.8756N
Lo1 = 239.5089E = 120.4911W
Res. & Comp. flag = 0 0 0 0 1 0 0 0
Lov = 255.000E = 105.000W
Dx = Dy = 68.153 km
Projection Flag (Bit 1) = 0
Scanning Mode (Bits 1 2 3) = 0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 22.8756N, 120.4911W
(1,62) = 52.4887N, 136.5458W
(81,62) = 46.0172N, 60.8284W
(81,1) = 20.1284N, 81.2432W

The pole point is at (I,J) = (31.91,112.53)

90 Arakawa semi-staggered E-grid on rotated latitude/longitude grid (used by the 80 km eta model)

Ni = 12902
Nj = 1
La1 = 0.182N
Lo1 = 210.113E = 149.887W
Res. & Comp. flag = 1 0 0 0 1 0 0 0
La2 = 92
Lo2 = 141
Di = 577 millidegrees (=15/26 deg)
Dj = 538 millidegrees (=14/26 deg)
Scanning Mode = 01000000

Note: The rotation of the coordinates is such that the intersection of the "prime meridian" and the "equator" is located at the central latitude and longitude of the grid, 52.0N, 111.0W.

----

91 Arakawa filled E-grid on rotated latitude/longitude grid (used by the 80 km eta model)

Ni = 25803
Nj = 1
La1 = 0.182N
Lo1 = 210.113E = 149.887W
Res. & Comp. flag = 1 0 0 0 1 0 0 0
La2 = 183
Lo2 = 141
Di = 577 millidegrees (=15/26 deg)
Dj = 538 millidegrees (=14/26 deg)
Scanning Mode = 01000000

Note: The rotation of the coordinates is such that the intersection of the "prime meridian" and the "equator" is located at the central latitude and longitude of the grid, 52.0N, 111.0W.

92 Arakawa semi-staggered E-grid on rotated latitude/longitude grid (used by the 32 km eta model)

Ni = 27071
Nj = 3 (81213 points)
La1 = 0.407N
Lo1 = 215.906E = 144.094W
Res. & Comp. flag = 1 0 0 0 1 0 0 0
La2 = 223
Lo2 = 365
Di = 222.222 millidegrees (=2/9 deg)
Dj = 205.128 millidegrees (=8/39 deg)
Scanning Mode = 01000000

Note: The rotation of the coordinates is such that the intersection of the "prime meridian" and the "equator" is located at the central latitude and longitude of the grid, 50.0N, 107.0W.

----

93 Arakawa filled E-grid on rotated latitude/longitude grid (used by the 32 km eta model)

Ni = 445
Nj = 365
La1 = 0.407N
Lo1 = 215.906E = 144.094W
Res. & Comp. flag = 1 0 0 0 1 0 0 0
La2 = 445
Lo2 = 365
Di = 222.222 millidegrees (= 2/9 deg)
Dj = 205.128 millidegrees (= 8/39 deg)
Scanning Mode = 01000000

Note: The rotation of the coordinates is such that the intersection of the "prime meridian" and the "equator" is located at the central latitude and longitude of the grid, 50.0N, 107.0W.

94 Arakawa semi-staggered E-grid on rotated latitude/longitude grid (used by the 29 km eta model)

Ni = 48916
Nj = 1
La1 = 9.678N
Lo1 = 231.174E = 128.826W
Res. & Comp. flag = 1 0 0 0 1 0 0 0
La2 = 181
Lo2 = 271
Di = 194 millidegrees (=7/36 deg)
Dj = 185 millidegrees (=5/27 deg)
Scanning Mode = 01000000

Note: The rotation of the coordinates is such that the intersection of the "prime meridian" and the "equator" is located at the central latitude and longitude of the grid, 41.0N, 97.0W.

----

95 Arakawa filled E-grid on rotated latitude/longitude grid (used by the 29 km eta model)

Ni = 97831
Nj = 1
La1 = 9.678N
Lo1 = 231.174E = 128.826W
Res. & Comp. flag = 1 0 0 0 1 0 0 0
La2 = 361
Lo2 = 271
Di = 194 millidegrees (=7/36 deg)
Dj = 185 millidegrees (=5/27 deg)
Scanning Mode = 01000000

Note: The rotation of the coordinates is such that the intersection of the "prime meridian" and the "equator" is located at the central latitude and longitude of the grid, 41.0N, 97.0W.

96 Arakawa semi-staggered E-grid on rotated latitude/longitude grid (used by the 48-km ETA Model)

Ni =	41630
N j =	1
La1 =	3.441S
Lo1 =	148.799W
Res. & Comp Flag =	10001000
La2 =	160
Lo2 =	261
Di =	333 millidegrees (= 1/3 deg)
Dj =	308 millidegrees (= 4/13 deg)
Scanning Mode =	01000000

---

97 Arakawa filled E-grid on rotated latitude/longitude grid (used by the 48-km ETA Model)

Ni =	83259
Nj =	1
La1 =	3.441S
Lo1 =	148.799W
Res. & Comp Flag =	10001000
La2 =	319
Lo2 =	261
Di =	333 millidegrees (=1/3 deg)
Dj =	308 millidegrees (=4/13 deg)
Scanning Mode =	01000000

98 Global Gaussian Latitude/Longitude T62 Resolution

Ni =	192
Nj =	94
La1 =	88.542N
Lo1 =	0.0E
Res. & Comp. flag =	1 0 0 0 0 0 0 0
La2 =	88.542S
Lo2 =	358.125E = 1.875W
Di =	1.875 degrees
N =	47 (number of lat. circles, pole to equator)
Scanning Mode =	00000000(NB:matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1) =	88.542N, 0.0E (upper left)
(1,190) =	88.542S, 0.0E
(384,190) =	88.542S, 359.0625E
(384,1) =	88.542N, 359.0625E

----

126 Global Gaussian Latitude/Longitude T126 Resolution

Ni =	384
Nj =	190
La1 =	89.277N
Lo1 =	0.0E
Res. & Comp. flag =	1 0 0 0 0 0 0 0
La2 =	89.277S
Lo2 =	359.0625E = 0.9375W
Di =	0.9375 degrees
N =	95 (# of lat circles pole to equator)
Scanning Mode =	00000000 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1) =	89.277N, 0.0E (upper left)
(1,190) =	89.277S, 0.0E
(384,190) =	89.277S, 359.0625E
(384,1) =	89.277N, 359.0625E

AWIPS STORAGE AND TRANSMISSION GRIDS

Note: The following grids are intended for use in the U.S. Weather Service's Advanced Weather Information Processing System (AWIPS). Their definition is subject to change as the AWIPS requirements are further refined. The parenthetical letters adjacent to the numeric values are the WMO header identification of the grid for headers starting with "Y" or "Z". For headers starting with "O", the bracketed letter is the WMO header identification for oceanographic grids. See appendix A.

VALUE AWIPS GRID DESCRIPTIONS
(See Table C for definition of symbols)

201 (A) Northern Hemispheric
(polar stereographic)

Nx =	65
Ny =	65
La1 =	-20.826N = 20.826S
Lo1 =	210.000E = 150.000W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	255.000E = 105.000W
Dx = Dy =	381.000 km
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

The pole point is at (I,J) = (33,33)
Map 201 is the same as NCEP storage grid 27, except it is rotated to 105 deg. orientation.

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202 (I) National - CONUS
(polar stereographic)

Nx =	65
Ny =	43
La1 =	7.838N
Lo1 =	218.972E = 141.028W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	255.000E = 105.000W
Dx = Dy =	190.500 km
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 7.838N, 141.028W
(1,43) = 35.616N, 168.577E
(65,43) = 35.617N, 18.576W
(65,1) = 7.838N, 68.973W

The pole point is at (I,J) = (33,45)

203 (J) National - Alaska
(polar stereographic)

Nx =	45
Ny =	39
La1 =	19.132N
Lo1 =	174.163E = 185.837W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	210.000E = 150.000W
Dx = Dy =	190.500 km
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 19.132N, 174.163E
(1,39) = 44.646N, 115.601E
(45,39) = 57.634N, 53.660W
(45,1) = 24.361N, 123.434W

The pole point is at (I,J) = (27,37)

---

204 (K) National - Hawaii
(Mercator)

Ni =	93
Nj =	68
La1 =	25.000S
Lo1 =	110.000E
Res. & Comp. flag =	1 0 0 0 0 0 0 0
La2 =	60.644N
Lo2 =	109.129W
Latin =	20.000
Scanning Mode (Bits 1 2 3) =	0 1 0
Di = Dj =	160.000 km

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 25.000S, 110.000E
(1,68) = 60.644N, 110.000E
(93,68) = 60.644N, 109.129W
(93,1) = 25.000S, 109.129W

The longitudinal grid spacing is 1.531 degrees.

205 (L) National - Puerto Rico
(polar stereographic)

Nx =	45
Ny =	39
La1 =	0.616N
Lo1 =	275.096E = 84.904W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	300.000E = 60.000W
Dx = Dy =	190.500 km
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 0.616N, 84.904W
(1,39) = 36.257N, 115.304W
(45,39) = 45.620N, 15.000W
(45,1) = 3.389N, 42.181W

The pole point is at (I,J) = (27,57)

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206 (M) Regional - Central US MARD
(Lambert Conformal)

Nx =	51
Ny =	41
La1 =	22.289N
Lo1 =	242.009E = 117.991W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	265.000E = 95.000W
Dx = Dy =	81.2705 km
Projection Flag =	0 (not bipolar)
Scanning Mode (Bits 1 2 3) =	0 1 0
Latin 1 =	25.000N
Latin 2 =	25.000N (tangent cone)

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 22.289N, 117.991W
(1,41) = 50.081N, 124.898W
(51,41) = 51.072N, 73.182W
(51,1) = 23.142N, 78.275W

The Pole is at (I,J) = (30.000,169.745)

The Dx, Dy grid increment (at 25 deg north) was selected so that the grid spacing would be exactly 80.000 km at 35 deg north; the intersection of 35N & 95W falls on point (30,16).

207 (N) Regional - Alaska
(polar stereographic)

Nx =	49
Ny =	35
La1 =	42.085N
Lo1 =	184.359E = 175.641W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	210.000E = 150.000W
Dx = Dy =	95.250 km
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 42.085N, 175.641W
(1,35) = 63.976N, 153.689E
(49,35) = 63.976N, 93.689W
(49,1) = 42.085N, 124.359W

The pole point is at (I,J) = (25,51)

----

208 (O) Regional - Hawaii
(Mercator)

Ni =	29
Nj =	27
La1 =	9.343N
Lo1 =	192.685E = 167.315W
Res. & Comp. flag =	1 0 0 0 0 0 0 0
La2 =	28.092N
Lo2 =	145.878W
Latin =	20.000
Scanning Mode (Bits 1 2 3) =	0 1 0
Di = Dj =	80.000 km

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 9.343N, 167.315W
(1,27) = 28.092N, 167.315W
(29,27) = 28.092N, 145.878W
(29,1) = 9.343N, 145.878W

The longitudinal grid spacing is 0.766 degrees. The grid is positioned such that the odd-numbered rows and columns coincide with the National grid, No. 204; the lower left corner of the regional grid is located at National (204) grid-point (55,24) and the upper right corner is located at (69,37).

209 (S) Regional - Central US MARD - Double Res.
(Lambert Conformal)

Nx =	101
Ny =	81
La1 =	22.289N
Lo1 =	242.009E = 117.991W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	265.000E = 95.000W
Dx = Dy =	40.63525 km
Projection Flag =	0 (not bipolar)
Scanning Mode (Bits 1 2 3) =	0 1 0
Latin 1 =	25.000N
Latin 2 =	25.000N (tangent cone)

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 22.289N, 117.991W
(1,81) = 50.081N, 124.898W
(101,81) = 51.072N, 73.182W
(101,1) = 23.142N, 78.275W

The Pole is at (I,J) = (59.000,338.490)

The Dx, Dy grid increment (at 25 deg north) was selected so that the grid spacing would be exactly 40.000 km at 35 deg north; the intersection of 35N & 95W falls on point (59,31).

----

210 (P) Regional - Puerto Rico
(Mercator)

Ni =	25
Nj =	25
La1 =	9.000N
Lo1 =	283.000E = 77.000W
Res. & Comp. flag =	1 0 0 0 0 0 0 0
La2 =	26.422N
Lo2 =	58.625W
Latin =	20.000
Di = Dj =	80.000 km
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 9.000N, 77.000W
(1,25) = 26.422N, 77.000W
(25,25) = 26.422N, 58.625W
(25,1) = 9.000N, 58.626W

The longitudinal grid spacing is 0.766 degrees

Table B: GRIDS (cont.)

211 (Q) Regional - CONUS
(Lambert Conformal)

Nx =	93
Ny =	65
La1 =	12.190N
Lo1 =	226.541E = 133.459W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	265.000E = 95.000W
Dx = Dy =	81.2705 km
Projection Flag =	0 (not bipolar)
Scanning Mode (Bits 1 2 3) =	0 1 0
Latin 1 =	25.000N
Latin 2 =	25.000N (tangent cone)

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 12.190N, 133.459W
(1,65) = 54.536N, 152.856W
(93,65) = 57.290N, 49.385W
(93,1) = 14.335N, 65.091W

The Pole is at (I,J) = (53.000,178.745)

The Dx, Dy grid increment (at 25 deg north) was selected so that the grid spacing would be exactly 80.000 km at 35 deg north; the intersection of 35N & 95W falls on point (53,25).

----

212 (R)[R] Regional - CONUS - double resolution
(Lambert Conformal)

Nx =	185
Ny =	129
La1 =	12.190N
Lo1 =	226.541E = 133.459W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	265.000E = 95.000W
Dx = Dy =	40.63525 km
Projection Flag =	0 (not bipolar)
Scanning Mode (Bits 1 2 3) =	0 1 0
Latin 1 =	25.000N
Latin 2 =	25.000N (tangent cone)

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 12.190N, 133.459W
(1,129) = 54.536N, 152.856W
(185,129) = 57.290N, 49.385W
(185,1) = 14.335N, 65.091W

The Pole is at (I,J) = (105.000,356.490)

The Dx, Dy grid increment (at 25 deg north) was selected so that the grid spacing would be exactly 40.000 km at 35 deg north; the intersection of 35N & 95W falls on point (105,49).

213 (H) National - CONUS - Double Resolution
(polar stereographic)

Nx =	129
Ny =	85
La1 =	7.838N
Lo1 =	218.972E = 141.028W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	255.000E = 105.000W
Dx = Dy =	95.250 km
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) =	7.838N, 141.028W
(1,85) =	35.617N, 168.577E
(129,85) =	35.617N, 18.577W
(129,1) =	7.838N, 68.973W

The pole point is at (I,J) = (65,89)

----

214 (T)[T] Regional - Alaska - Double Resolution
(polar stereographic)

Nx =	97
Ny =	69
La1 =	42.085N
Lo1 =	184.359E = 175.641W
Res. & Comp. flag =	0 0 0 0 1 0 0 0
Lov =	210.000E = 150.000W
Dx = Dy =	47.625 km
Projection Flag(Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0

For reference here are the lat/lon values of the corners of the grid:

(1,1) =	42.085N, 175.641W
(1,69) =	63.975N, 153.690E
(97,69) =	63.975N, 93.689W
(97,1) =	42.085N, 124.358W

The pole point is at (I,J) = (49,101)

215 (U)[U] AWIPS grid over the contiguous United States - quadruple resolution (used by the 29-km ETA Model) (Lambert Conformal)

Nx =	369
Ny =	257
La1 =	12.190N
Lo1 =	226.514E = 133.459W
Res. & Comp Flag =	00001000
Lov =	265.000E = 95.000W
Dx = Dy =	20.317625 km
Projection flag =	0 (not bipolar)
Scanning Mode (Bits 1 2 3) =	010
Latin 1 =	25.000N
L atin 2 =	25.000N (tangent cone)

For reference here are the lat/lon values of the corners of the grid:

(1,1) = 12.190N, 133.459W
(1,129) = 54.536N, 152.856W
(185,129) = 57.290N, 49.385W
(185,1) = 14.335N, 65.091W

The Pole is at (I,J) = (209.000,711.980)

The Dx, Dy grid increment (at 25 deg north) was selected so that the grid spacing would be exactly 20.000 km at 35 deg north; the intersection of 35N & 95W falls on point (209,97).

----

216 (V)[V] AWIPS Grid over Alaska (used by the 29-km ETA Model) (polar stereographic)

Nx =	139
Ny =	107
La1 =	30.000N
Lo1 =	187.000E = 173.000W
Res. & Comp Flag =	00001000
Lov =	225.000E = 135.000W
Dx = Dy =	45.000 km
Projection flay (bit 1) =	0
Scanning Mode (bits 1 2 3) =	010

For reference, here are the lat/lon corners of the grid:

(1,1) =	30.000 N, 173.000 W
(1,107) =	50.454 N, 143.597 E
(139,107) =	70.111 N, 62.850 W
(139,1) =	38.290 N, 114.856 W

The pole is at (I,J) = (94.909, 121.198)

217 (W) AWIPS Local Alaska high resolution grid (Polar Stereographic)

Nx =	289
Ny =	205
La1 =	42.085N
Lo1 =	184.359E = 175.641W
Res. & Comp Flag =	00001000
Lov =	210.000E = 150.000W
Dx = Dy =	15.875 km
Projection flay (bit 1) =	0
Scanning Mode (bits 1 2 3) =	010

For reference, here are the lat/lon corners of the grid:

(1,1) = 42.085 N, 175.641 W
(1,205) = 63.975 N, 153.690 E
(289,205) = 63.975 N, 093.689 W
(289,1) = 42.085 N, 124.358 W

The pole is at (I,J) = (145.000, 301.000)

----

218 (B)[B] AWIPS Grid over the Contiguous United States (used by the 10-km ETA Model) (Lambert Conformal)

Nx =	737
Ny =	513
La1 =	12.190N
Lo1 =	226.514E = 133.459W
Res. & Comp Flag =	00001000
Lov =	265.000E = 95.000W
Dx = Dy =	10.1588215
Projection flay (bit 1) =	0 (not bipolar)
Scanning Mode (bits 1 2 3) =	010

For reference, here are the lat/lon corners of the grid:

(1,1) = 12.190 N, 133.459 W
(1,513) = 54.536 N, 152.856 W
(737,513) = 57.290 N, 049.385 W
(737,1) = 14.335 N, 065.091 W

The pole is at (I,J) = (417.002, 1427.916)

219 (C)[C] AWIPS Grid over the Northern Hemisphere to depict SSMI-derived Ice concentrations (polar stereographic)

Nx =	385
Ny =	465
La1 =	25.008N
Lo1 =	250.441E = 119.559W
Res. & Comp Flag =	01001000
Lov =	280.000E = 080.000W
Dx = Dy =	25.4 km at 60N
Projection flay (bit 1) =	0
Scanning Mode (bits 1 2 3) =	010

For reference, here are the lat/lon corners of the grid:

(1,1) = 25.008 N, 119.559 W
(1,465) = 24.468 N, 139.075 E
(385,465) = 24.028 N, 060.339 E
(385,1) = 24.561 N, 039.853 W

The pole is at (I,J) = (191.000, 231.000)

----

220 (D)[D] AWIPS Grid over the Southern Hemisphere to depict SSMI-derived Ice concentrations (polar stereographic)

Nx =	345
Ny =	355
La1 =	36.889S
Lo1 =	139.806E = 220.194W
Res. & Comp Flag =	01001000
Lov =	100.000E = 260.000W
Dx = Dy =	25.4 km at 60S
Projection flay (bit 1) =	1
Scanning Mode (bits 1 2 3) =	010

For reference, here are the lat/lon corners of the grid:

(1,1) = 36.899 S, 139.806 E
(1,355) = 37.801 S, 120.763 W
(345,355) = 31.850 S, 031.899 W
(345,1) = 31.094 S, 052.857 E

The pole is at (I,J) = (151.000, 181.000)

221 (E)[E] Regional - NOAMHI - high resolution North American Master Grid (Lambert Conformal)

Nx =	349
Ny =	277
La1 =	1.000N
Lo1 =	214.500E = 145.500W
Res. & Comp Flag =	00001000
Lov =	253.000E = 107.000W
Dx = Dy =	32.46341 km
Projection flay (bit 1) =	0
Scanning Mode (bits 1 2 3) =	010
Latin 1 =	50.000N
Latin 2 =	50.000N

For reference, here are the lat/lon corners of the grid:

(1,1) = 01.000 N, 145.500 W
(1,277) = 46.635 N, 148.639 E
(349,277) = 46.352 N, 002.566 W
(349,1) = 00.897 N, 068.318 W

The pole is at (I,J) = (174.507, 307.764)

----

222 (F) Regional - NOAMLO - low resolution North American Master Grid (Lambert Conformal)

Nx =	59
Ny =	47
La1 =	1.000N
Lo1 =	214.500E = 145.500W
Res. & Comp Flag =	00001000
Lov =	253.000E = 107.000W
Dx = Dy =	194.78048 km
Projection flay (bit 1) =	0
Scanning Mode (bits 1 2 3) =	010
Latin 1 =	50.000N
Latin 2 =	50.000N

For reference, here are the lat/lon corners of the grid:

(1,1) = 01.000 N, 145.500 W
(1,47) = 46.635 N, 148.639 E
(59,47) = 46.352 N, 002.566 W
(59,1) = 00.897 N, 068.318 W

The pole is at (I,J) = (29.918, 52.127)

223 (G)	Hemispheric - double resolution (Polar Stereographic)	
	Nx =	129
	Ny =	129
	La1 =	-20.826N = 20.826S
	Lo1 =	210.000E = 150.000W
	Res. & Comp Flag =	00001000
	Lov =	255.000E = 105.000W
	Dx = Dy =	190.500 km
	Projection flay (bit 1) =	0
	Scanning Mode (bits 1 2 3) =	010

The pole is at (I,J) = (65.000, 65.000)

----

224 (Z)	Southern Hemispheric (polar stereographic)	
	Nx =	65
	Ny =	65
	La1 =	20.826N
	Lo1 =	120.000E
	Res. & Comp. flag =	00001000
	Lov =	105.000W
	Dx = Dy =	381.000 km
	Projection Flag (Bit 1) =	0
	Scanning Mode (Bits 1 2 3) =	0 1 0

For reference, here are the lat/lon corners of the grid:

(1,1) = 20.826 N, 120.000 E
(1,65) = 20.826 N, 150.000 W
(65,65) = 20.826 N, 060.000 W
(65,1) = 20.826 N, 030.000 E

The pole point is at (I,J) = (33,33)

225 (Z) National Double Resolution - Hawaii
(Mercator)

Ni =	185
Nj =	135
La1 =	25.000S
Lo1 =	110.000E = 250.000W
Res. & Comp Flag =	10000000
La2 =	60.64N
Lo2 =	109.129W = 250.871W
Latin =	20.000
Di = Dj =	80.000 km
Scanning Mode (bits 1 2 3) = 010	

For reference, here are the lat/lon corners of the grid:

(1,1) = 25.000 S, 110.000 E
(1,68) = 60.644 N, 110.000 E
(93,68) = 60.644 N, 109.129 W
(93,1) = 25.000 S, 109.129 W

----

226 (Z) AWIPS grid over the contiguous United States - 8X Resolution (10 km)
(Used by the Radar mosaics) (Lambert Conformal)

Nx =	737
Ny =	513
La1 =	12.190N
Lo1 =	226.514E = 133.459W
Res. & Comp Flag =	00001000
Lov =	265.000E = 95.000W
Dx = Dy =	10.1588125 km
Projection flay (bit 1) =	0 (not bipolar)
Scanning Mode (bits 1 2 3) = 010	
Latin 1 =	25.000N
Latin 2 =	25.000N (tangent cone)

For reference, here are the lat/lon corners of the grid:

(1,1) = 12.190 N, 133.459 W
(1,129) = 54.536 N, 152.856 W
(185,129) = 57.290 N, 049.385 W
(185,1) = 14.335 N, 065.091 W

The pole is at (I,J) = (209.000, 711.980)

The Dx, Dy grid increment (at 25 deg. N) was selected so that the grid spacing would be exactly 20.000 km at 25 deg. N; the ilntersection of 35N, 95W falls on point (209,97).

227 (Z) AWIPS grid over the contiguous United States - 16X Resolution (5 km) (Used by the Radar Stage IV precipitation analyses and Satellite-derived Precipitation Estimates) (Lambert Conformal)

Nx =	1473
Ny =	1025
La1 =	12.190N
Lo1 =	226.514E = 133.459W
Res. & Comp Flag =	00001000
Lov =	265.000E = 95.000W
Dx = Dy =	5.07940625 km
Projection flay (bit 1) =	0 (not bipolar)
Scanning Mode (bits 1 2 3) =	010
Latin 1 =	25.000N
Latin 2 =	25.000N (tangent cone)

For reference, here are the lat/lon corners of the grid:

(1,1) = 12.190 N, 133.459 W
(1,129) = 54.536 N, 152.856 W
(185,129) = 57.290 N, 049.385 W
(185,1) = 14.335 N, 065.091 W

The pole is at (I,J) = (209.000, 711.980)

The Dx, Dy grid increment (at 25 deg. N) was selected so that the grid spacing would be exactly 20.000 km at 35 deg. N; the intersection of 35N and 95W falls on point (209,97).

----

228 (Z)[A] AWIPS Global (longitude/latitude grid)

Ni =	144
Nj =	73
La1 =	90.000N
Lo1 =	00.000E
Res. & Comp. Flag =	10000000
La2 =	90.000S
Lo2	357.5000E = 2.500W
Di =	2.500 degrees
Dj =	2.500 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)=	90.000N, 000.000E
(1,73)=	90.000S, 000.000E
(144,73)=	90.000S, 359.000E
(144,1)=	90.000N, 359.000E

----

229 (Z)[F] AWIPS Global (longitude/latitude grid)

Ni =	360
Nj =	181
La1 =	90.000N
Lo1 =	00.000E
Res. & Comp. Flag =	10000000
La2 =	90.000S
Lo2	359.000E = 1.000W
Di =	1.000 degrees
Dj =	1.000 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)=	90.000N, 000.000E
(1,181)=	90.000S, 000.000E
(360,181)=	90.000S, 359.000E
(360,1)=	90.000N, 359.000E

----

230 (Z)[G] AWIPS Global (longitude/latitude grid)

Ni =	720
Nj =	361
La1 =	90.000N
Lo1 =	00.000E
Res. & Comp. Flag =	10000000
La2 =	90.000S
Lo2	359.500E = 0.500W
Di =	0.500 degrees
Dj =	0.500 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)= 90.000N, 000.000E
(1,361)= 90.000S, 000.000E
(720,361)=90.000S, 359.000E
(720,1)= 90.000N, 359.000E

----

231 (Z)[H] AWIPS Northern Hemisphere (longitude/latitude grid)

Ni =	720
Nj =	181
La1 =	000.000N
Lo1 =	000.000E
Res. & Comp. Flag =	10000000
La2 =	90.000N
Lo2	359.500E = 0.500W
Di =	0.500 degrees
Dj =	0.500 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)= 00.000N, 000.000E
(1,181)= 90.000N, 000.000E
(720,181)=90.000N, 359.000E
(720,1)= 00.000N, 359.000E

----

232 (Z)[I] AWIPS Northern Hemisphere (longitude/latitude grid)

Ni =	360
Nj =	91
La1 =	000.000N
Lo1 =	000.000E
Res. & Comp. Flag =	10000000
La2 =	90.000N
Lo2	359.000E = 1.000W
Di =	1.000 degrees
Dj =	1.000 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)=	00.000N, 000.000E
(1,91)=	90.000N, 000.000E
(360,91)=	90.000N, 359.000E
(360,1)=	00.000N, 359.000E

----

233 (Z)[J] AWIPS Regional (longitude/latitude grid)

Ni =	288
Nj =	157
La1 =	78.000N
Lo1 =	000.000E
Res. & Comp. Flag =	10000000
La2 =	78.000S
Lo2	358.750E = 1.250W
Di =	1.250 degrees
Dj =	1.000 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)=	90.000N, 000.000E
(1,73)=	90.000S, 000.000E
(144,73)=	90.000S, 359.000E
(144,1)=	90.000N, 359.000E

----

234 (Z)[K] AWIPS Regional (longitude/latitude grid)

Ni =	133
Nj =	121
La1 =	15.000N
Lo1 =	262.000E = 98.000W
Res. & Comp. Flag =	10000000
La2 =	45.000S
Lo2	295.000E = 65.000W
Di =	0.250 degrees
Dj =	0.250 degrees
Projection Flag (Bit 1) =	0
Scanning Mode (Bits 1 2 3) =	0 1 0 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)=	15.000N, 262.000E
(1,73)=	15.000S, 295.000E
(144,73)=	45.000S, 295.000E
(144,1)=	90.000N, 262.000E

235(Z)(L) AWIPS Global (longitude/latitude grid)

Ni =	720
Nj =	360
La1 =	89.750N
Lo1 =	00.250E
Res. & Comp. Flag =	01001000
La2 =	89.750S
Lo2 =	359.75E = 000.250W
Projection Flag (bit 1) =	0
Scanning Mode (bits 1 2 3) =	010 (NB: matrix style)

For reference here are the lat/lon values of the corners of the grid:

(1,1)=	89.750N, 000.250E
(1,360)=	89.750S, 000.250E
(720,360)=	89.750S, 359.750E
(720,1)=	89.750N, 359.750E

TABLE C

NATIONAL SUB-CENTERS
(Assigned By The Nation)
(PDS Octet 26)

The following are sub-center values for Center 7, the US National Centers for Environmental Prediction

VALUE	CENTER
1	NCEP Re-Analysis Project
2	NCEP Ensemble Products
3	NCEP Central Operations
4	Environmental Modeling Center
5	Hydrometeorological Prediction Center
6	Marine Prediction Center
7	Climate Prediction Center
8	Aviation Weather Center
9	Storm Prediction Center
10	Tropical Prediction Center
11	NWS Techniques Development Laboratory
12	NESDIS Office of Research and Applications

TABLE 1. FLAG FOR GDS OR BMS
(PDS Octet 8)

The bit flag indicates the omission or inclusion of the Grid Description and/or Bit Map Sections.

BIT	VALUE	MEANING
1	0	GDS Omitted
	1	GDS Included
2	0	BMS Omitted
	1	BMS Included
3-8	0	reserved

Note: Bits are enumerated from left to right

TABLE 2. PARAMETERS & UNITS[1]
Version 2
(PDS Octet 9)

VALUE	PARAMETER	UNITS	ABBREV.
000	Reserved		
001	Pressure	Pa	PRES
002	Pressure reduced to MSL	Pa	PRMSL
003	Pressure tendency	Pa/s	PTEND
004	Potential vorticity	$Km^2/kg/s$	PVORT
005	ICAO Standard Atmosphere Reference Height	m	ICAHT
006	Geopotential	m^2/s^2	GP
007	Geopotential height	gpm	HGT
008	Geometric height	m	DIST
009	Standard deviation of height	m	HSTDV
010	Total ozone	Dobson	TOZNE
011	Temperature	K	TMP
012	Virtual temperature	K	VTMP
013	Potential temperature	K	POT
014	Pseudo-adiabatic potential temperature or equivalent potential temperature	K	EPOT
015	Maximum temperature	K	T MAX
016	Minimum temperature	K	T MIN
017	Dew point temperature	K	DPT
018	Dew point depression (or deficit)	K	DEPR
019	Lapse rate	K/m	LAPR
020	Visibility	m	VIS
021	Radar Spectra (1)	-	RDSP1
022	Radar Spectra (2)	-	RDSP2
023	Radar Spectra (3)	-	RDSP3
024	Parcel lifted index (to 500 hPa)	K	PLI
025	Temperature anomaly	K	TMP A
026	Pressure anomaly	Pa	PRESA
027	Geopotential height anomaly	gpm	GP A
028	Wave Spectra (1)	-	WVSP1
029	Wave Spectra (2)	-	WVSP2
030	Wave Spectra (3)	-	WVSP3
031	Wind direction (from which blowing)	deg true	WDIR
032	Wind speed	m/s	WIND
033	u-component of wind	m/s	U GRD
034	v-component of wind	m/s	V GRD
035	Stream function	m^2/s	STRM

[1] See notes at the end of the table

036	Velocity potential	m^2/s	V POT
037	Montgomery stream function	m^2/s^2	MNTSF
038	Sigma coordinate vertical velocity	/s	SGCVV
039	Vertical velocity (pressure)	Pa/s	V VEL
040	Vertical velocity (geometric)	m/s	DZDT
041	Absolute vorticity	/s	ABS V
042	Absolute divergence	/s	ABS D
043	Relative vorticity	/s	REL V
044	Relative divergence	/s	REL D
045	Vertical u-component shear	/s	VUCSH
046	Vertical v-component shear	/s	VVCSH
047	Direction of current	Degree true	DIR C
048	Speed of current	m/s	SP C
049	u-component of current	m/s	UOGRD
050	v-component of current	m/s	VOGRD
051	Specific humidity	kg/kg	SPF H
052	Relative humidity	%	R H
053	Humidity mixing ratio	kg/kg	MIXR
054	Precipitable water	kg/m^2	P WAT
055	Vapor pressure	Pa	VAPP
056	Saturation deficit	Pa	SAT D
057	Evaporation	kg/m^2	EVP
058	Cloud Ice	kg/m^2	C ICE
059	Precipitation rate	$kg/m^2/s$	PRATE
060	Thunderstorm probability	%	TSTM
061	Total precipitation	kg/m^2	A PCP
062	Large scale precipitation (non-conv.)	kg/m^2	NCPCP
063	Convective precipitation	kg/m^2	ACPCP
064	Snowfall rate water equivalent	$kg/m^2/s$	SRWEQ
065	Water equiv. of accum. snow depth	kg/m^2	WEASD
066	Snow depth	m	SNO D
067	Mixed layer depth	m	MIXHT
068	Transient thermocline depth	m	TTHDP
069	Main thermocline depth	m	MTHD
070	Main thermocline anomaly	m	MTH A
071	Total cloud cover	%	T CDC
072	Convective cloud cover	%	CDCON
073	Low cloud cover	%	L CDC
074	Medium cloud cover	%	M CDC
075	High cloud cover	%	H CDC
076	Cloud water	kg/m^2	C WAT
077	Best lifted index (to 500 hPa)	K	BLI
078	Convective snow	kg/m^2	SNO C
079	Large scale snow	kg/m^2	SNO L
080	Water Temperature	K	WTMP

TABLE 2. PARAMETER & UNITS
(continued)

VALUE	PARAMETER	UNITS	ABBREV.
081	Land cover (land=1, sea=0) (see note)	proportion	LAND
082	Deviation of sea level from mean	m	DSL M
083	Surface roughness	m	SFC R
084	Albedo	%	ALBDO
085	Soil temperature	K	TSOIL
086	Soil moisture content	kg/m^2	SOIL M
087	Vegetation	%	VEG
088	Salinity	kg/kg	SALTY
089	Density	kg/m^3	DEN
090	Water runoff	kg/m^2	WATR
091	Ice cover (ice=1, no ice=0) (See Note)	proportion	ICE C
092	Ice thickness	m	ICETK
093	Direction of ice drift	deg. true	DICED
094	Speed of ice drift	m/s	SICED
095	u-component of ice drift	m/s	U ICE
096	v-component of ice drift	m/s	V ICE
097	Ice growth rate	m/s	ICE G
098	Ice divergence	/s	ICE D
099	Snow melt	kg/m^2	SNO M
100	Significant height of combined wind waves and swell	m	HTSGW
101	Direction of wind waves (from which)	Degree true	WVDIR
102	Significant height of wind waves	m	WVHGT
103	Mean period of wind waves	s	WVPER
104	Direction of swell waves	Degree true	SWDIR
105	Significant height of swell waves	m	SWELL
106	Mean period of swell waves	s	SWPER
107	Primary wave direction	Degree true	DIRPW
108	Primary wave mean period	s	PERPW
109	Secondary wave direction	Degree true	DIRSW
110	Secondary wave mean period	s	PERSW
111	Net short-wave radiation (surface)	W/m^2	NSWRS
112	Net long wave radiation (surface)	W/m^2	NLWRS
113	Net short-wave radiation (top of atmosphere)	W/m^2	NSWRT
114	Net long wave radiation (top of atmosphere)	W/m^2	NLWRT
115	Long wave radiation flux	W/m^2	LWAVR
116	Short wave radiation flux	W/m^2	SWAVR
117	Global radiation flux	W/m^2	G RAD
118	Brightness temperature	K	BRTMP
119	Radiance (with respect to wave number)	W/m/sr	LWRAD
120	Radiance (with respect to wave length)	$W/m^3/sr$	SWRAD
121	Latent heat net flux	W/m^2	LHTFL

VALUE	PARAMETER	UNITS	ABBREV.
122	Sensible heat net flux	W/m^2	SHTFL
123	Boundary layer dissipation	W/m^2	BLYDP
124	Momentum flux, u component	N/m^2	U FLX
125	Momentum flux, v component	N/m^2	V FLX
126	Wind mixing energy	J	WMIXE
127	Image data		IMG D
128 - 254	Reserved for use by originating center		
	NWS/NCEP usage as follows...		
128	Mean Sea Level Pressure (Standard Atmosphere Reduction)	Pa	MSLSA
129	Mean Sea Level Pressure (MAPS System Reduction)	Pa	MSLMA
130	Mean Sea Level Pressure (ETA Model Reduction)	Pa	MSLET
131	Surface lifted index	K	LFT X
132	Best (4 layer) lifted index	K	4LFTX
133	K index	K	K X
134	Sweat index	K	S X
135	Horizontal moisture divergence	kg/kg/s	MCONV
136	Vertical speed shear	1/s	VW SH
137	3-hr pressure tendency Std. Atmos. Reduction	Pa/s	TSLSA
138	Brunt-Vaisala frequency (squared)	$1/s^2$	BVF 2
139	Potential vorticity (density weighted)	1/s/m	PV MW
140	Categorical rain (yes=1; no=0)	non-dim	CRAIN
141	Categorical freezing rain (yes=1; no=0)	non-dim	CFRZR
142	Categorical ice pellets (yes=1; no=0)	non-dim	CICEP
143	Categorical snow (yes=1; no=0)	non-dim	CSNOW
144	Volumetric soil moisture content	fraction	SOILW
145	Potential evaporation rate	W/m**2	PEVPR
146	Cloud workfunction	J/kg	CWORK
147	Zonal flux of gravity wave stress	N/m**2	U-GWD
148	Meridional flux of gravity wave stress	N/m**2	V-GWD
149	Potential vorticity	m**2/s/kg	PV
150	Covariance between meridional and zonal components of the wind. Defined as [uv]-[u][v], where "[]" indicates the mean over the	m^2/s^2	COVMZ

TABLE 2. PARAMETER & UNITS
(continued)

VALUE	PARAMETER	UNITS	ABBREV.
	indicated time span.		
151	Covariance between temperature and zonal component of the wind. Defined as [uT]-[u][T], where "[]" indicates the mean over the indicated time span.	K*m/s	COVTZ
152	Covariance between temperature and meridional component of the wind. Defined as [vT]-[v][T], where "[]" indicates the mean over the indicated time span.	K*m/s	COVTM
153	Cloud water	Kg/kg	CLWMR
154	Ozone mixing ratio	Kg/kg	O3MR
155	Ground Heat Flux	W/m^2	GFLUX
156	Convective inhibition	J/kg	CIN
157	Convective Available Potential Energy	J/kg	CAPE
158	Turbulent Kinetic Energy	J/kg	TKE
159	Condensation pressure of parcel lifted from indicated surface	Pa	CONDP
160	Clear Sky Upward Solar Flux	W/m^2	CSUSF
161	Clear Sky Downward Solar Flux	W/m^2	CSDSF
162	Clear Sky upward long wave flux	W/m^2	CSULF
163	Clear Sky downward long wave flux	W/m^2	CSDLF
164	Cloud forcing net solar flux	W/m^2	CFNSF
165	Cloud forcing net long wave flux	W/m^2	CFNLF
166	Visible beam downward solar flux	W/m^2	VBDSF
167	Visible diffuse downward solar flux	W/m^2	VDDSF
168	Near IR beam downward solar flux	W/m^2	NBDSF
169	Near IR diffuse downward solar flux	W/m^2	NDDSF
170	Rain water mixing ratio	Kg/Kg	RWMR
171	Snow mixing ratio	Kg/Kg	SNMR
172	Momentum flux	N/m^2	M FLX
173	Mass point model surface	non-dim	LMH
174	Velocity point model surface	non-dim	LMV
175	Model layer number (from bottom up)	non-dim	MLYNO
176	latitude (-90 to +90)	deg	NLAT
177	east longitude (0-360)	deg	ELON
178	Ice mixing ratio	Kg/Kg	ICMR
179	Graupel mixing ratio	Kg/Kg	GRMR
181	x-gradient of log pressure	1/m	LPS X
182	y-gradient of log pressure	1/m	LPS Y
183	x-gradient of height	m/m	HGT X

VALUE	PARAMETER	UNITS	ABBREV.
184	y-gradient of height	m/m	HGT Y
185	Turbulence SIGMET/AIRMET	non-dim	TURB
186	Icing SIGMET/AIRMET	non-dim	ICNG
187	Lightning	non-dim	LTNG
189	Virtual potential temperature	K	VPTMP
190	Storm relative helicity	m^2/s^2	HLCY
191	Probability from ensemble	numeric	PROB
192	Probability from ensemble normalized with respect to climate expectancy	numeric	PROBN
193	Probability of precipitation	%	POP
194	Probability of frozen precipitation	%	CPOFP
195	Probability of freezing precipitation	%	CPOZP
196	u-component of storm motion	m/s	USTM
197	v-component of storm motion	m/s	VSTM
198	Number concentration for ice particles		NCIP
199	Direct evaporation from bare soil	W/m^2	EVBS
200	Canopy water evaporation	W/m^2	EVCW
201	Ice-free water surface	%	ICWAT
204	downward short wave rad. flux	W/m^2	DSWRF
205	downward long wave rad. flux	W/m^2	DLWRF
206	Ultra violet index (1 hour integration centered at solar noon)	J/m^2	UVI
207	Moisture availability	%	MSTAV
208	Exchange coefficient	$(kg/m^3)(m/s)$	SFEXC
209	No. of mixed layers next to surface	integer	MIXLY
210	Transpiration	W/m^2	TRANS
211	upward short wave rad. flux	W/m^2	USWRF
212	upward long wave rad. flux	W/m^2	ULWRF
213	Amount of non-convective cloud	%	CDLYR
214	Convective Precipitation rate	$kg/m^2/s$	CPRAT
215	Temperature tendency by all physics	K/s	TTDIA
216	Temperature tendency by all radiation	K/s	TTRAD
217	Temperature tendency by non-radiation physics	K/s	TTPHY
218	precip.index(0.0-1.00)(see note)	fraction	PREIX
219	Std. dev. of IR T over 1x1 deg area	K	TSD1D
220	Natural log of surface pressure	ln(kPa)	NLGSP
221	Planetary boundary layer height	m	HPBL
222	5-wave geopotential height	gpm	5WAVH
223	Plant canopy surface water	kg/m^2	CNWAT
224	Soil type (as in Zobler)	Integer (0-9)	SOTYP
225	Vegitation type (as in SiB)	Integer (0-13)	VGTYP
226	Blackadar's mixing length scale	m	BMIXL
227	Asymptotic mixing length scale	m	AMIXL

VALUE	PARAMETER	UNITS	ABBREV.
228	Potential evaporation	kg/m^2	PEVAP
229	Snow phase-change heat flux	W/m^2	SNOHF
~~230~~	~~5-wave geopotential height anomaly~~	~~gpm~~	~~5WAVA~~
231	Convective cloud mass flux	Pa/s	MFLUX
232	Downward total radiation flux	W/m^2	DTRF
233	Upward total radiation flux	W/m^2	UTRF
234	Baseflow-groundwater runoff	kg/m^2	BGRUN
235	Storm surface runoff	kg/m^2	SSRUN
237	Total ozone	Kg/m^2	03TOT
238	Snow cover	percent	SNOWC
239	Snow temperature	K	SNO T
241	Large scale condensat. heat rate	K/s	LRGHR
242	Deep convective heating rate	K/s	CNVHR
243	Deep convective moistening rate	kg/kg/s	CNVMR
244	Shallow convective heating rate	K/s	SHAHR
245	Shallow convective moistening rate	kg/kg/s	SHAMR
246	Vertical diffusion heating rate	K/s	VDFHR
247	Vertical diffusion zonal acceleration	m/s^2	VDFUA
248	Vertical diffusion meridional accel	m/s^2	VDFVA
249	Vertical diffusion moistening rate	kg/kg/s	VDFMR
250	Solar radiative heating rate	K/s	SWHR
251	long wave radiative heating rate	K/s	LWHR
252	Drag coefficient	non-dim	CD
253	Friction velocity	m/s	FRICV
254	Richardson number	non-dim.	RI
255	Missing		

Notes:

1) By convention, downward net fluxes of radiation or other quantities are assigned negative values; upward net fluxes of radiation or other quantities are assigned positive values.

2) Unidirectional flux values, where the direction of flow is indicated in the name of the parameter (e.g., 204,205,211,212), shall all have positive values irrespective of the direction of flow. Net (vertical) fluxes shall be calculated by subtracting the downward flux values from the upward flux values.

3) The u and v components of vector quantities are defined with reference

to GDS Octet 17 and Table 7. However, if the GDS is **not** included in a message, then any wind components are assumed to be resolved relative to the grid specified in the PDS with u and v defined as positive in the direction of increasing x and y (or i and j) coordinates respectively.

4) Provision is made for three types of spectra:

1) Direction and Frequency
2) Direction and radial number
3) Radial number and radial number

5) Parameters 81 and 91 show the units as "fraction", thus allowing for a range of coverage. It is up to the user to employ the D (power of ten) scaling to assure that the necessary precision is retained in the numeric values.

6) Precipitation index (#218) defined as the fraction of satellite observed pixels with temperatures <235K over 1.0x1.0 box, centered at the gridpoint.

TABLE 2. PARAMETER & UNITS
(continued)

0-99 special codes, See Table 3a	0	0	
100 isobaric level	pressure in hectoPascals (hPa) (2 octets)		ISBL
101 layer between two isobaric levels	pressure of top (kPa)	pressure of bottom (kPa)	ISBY
102 mean sea level	0	0	MSL
103 Specified altitude above MSL	altitude in meters		GPML
104 layer between two specified altitudes above MSL	altitude of top (hm)	altitude of bottom (hm)	GPMY
105 specified height level above ground	height in meters (2 octets)		TGL
106 layer between two specified height levels above ground	height of top (hm)	height of bottom (hm)	HTGY
107 sigma level	sigma value in 1/10000 (2 octets)		SIGL
108 layer between two sigma levels	sigma value at top in 1/100	sigma value at bottom in 1/100	SIGY
109 Hybrid level	level number (2 octets)		HYBL
110 layer between two hybrid levels	level number of top	level number of bottom	HYBY
111 depth below land surface	centimeters (2 octets)		DBLL
112 layer between two depths below land surface	depth of upper surface (cm)	depth of lower surface (cm)	DBLY
113 isentropic (theta) level	Potential Temperature (K) (2 octets)		THEL

114 layer between two isentropic levels	475 K minus theta of top in K	475 K minus theta of bottom in K	THEY
115 level at specified pressure difference from ground to level	Pressure difference in hPa (2 octets)		SPDL
116 layer between two levels at specified pressure difference from ground to level	pressure difference from ground to top level in hPa	pressure difference from ground to bottom level in hPa	SPDY
117 potential vorticity (pv) surface	pv value in units of $10^{-6}Km^2/kgs$ (2 octets)		PVL
119 ETA level	ETA value in 1/10000 (2 octets)		ETAL
120 layer between two ETA levels	ETA value at top of layer in 1/100	ETA value at bottom of layer in 1/100	ETAY
121 layer between two isobaric surfaces (high precision)	1100 hPa minus pressure of top, in hPa	1100 hPa minus pressure of bottom, in hPa	IBYH
125 specified height level above ground (high precision)	Height in centimeters (2 octets)		HGLH
128 layer between two sigma levels (high precision)	1.1 minus sigma of top, in 1/1000 of sigma	1.1 minus sigma of bottom, in 1/1000 of sigma	SGYH
141 layer between two isobaric surfaces (mixed precision)	pressure of top, in hPa	1100hPa minus pressure of bottom, in hPa	IBYM
160 depth below sea level	Depth in meters (2 octets)		DBSL
200 entire atmosphere (considered as a single layer)	0 (2 octets)		EATM
201 entire ocean (considered as a single	0 (2 octets)		EOCN

TABLE 2. PARAMETER & UNITS
(continued)

layer)		

Note: The numbering allows for additions within this framework:

100-119	normal precision
120-139	high precision
140-159	mixed precision

TABLE 3a. SPECIAL LEVELS
(PDS Octet 10)

VALUE	LEVEL	ABBREV
00	Reserved	
01	Ground or water surface	SFC
02	Cloud base level	CBL
03	Cloud top level	CTL
04	Level of 0 deg (C) isotherm	0DEG
05	Level of adiabatic condensation lifted from the surface	ADCL
06	Maximum wind level	MWSL
07	Tropopause	TRO
08	Nominal top of atmosphere	NTAT
09	Sea bottom	SEAB
10-19	reserved	
20	Isothermal level (temperature in 1/100 K in octets 11 and 12)	TMPL
21-99	Reserved	

NCEP Special Levels & Layers:

204	Highest tropospheric freezing level	HTFL
209	Boundary layer cloud bottom level	BCBL
210	Boundary layer cloud top level	BCTL
211	Boundary layer cloud layer	BCY
212	Low cloud bottom level	LCBL
213	Low cloud top level	LCTL
214	Low cloud layer	LCY
222	Middle cloud bottom level	MCBL
223	Middle cloud top level	MCTL
224	Middle cloud layer	MCY
232	High cloud bottom level	HCBL
233	High cloud top level	HCTL
234	High cloud layer	HCY
242	Convective cloud bottom level	CCBL
243	Convective cloud top level	CCTL
244	Convective cloud layer	CCY

TABLE 4. FORECAST TIME UNIT
(PDS Octet 18)

VALUE	TIME UNIT
0	Minute
1	Hour
2	Day
3	Month
4	Year
5	Decade (10 years)
6	Normal (30 years)
7	Century
10	3 hours
11	6 hours
12	12 hours
13-253	Reserved
254	Second

TABLE 5.
TIME RANGE INDICATOR
(PDS Octet 21)

VALUE	MEANING
0	Forecast product valid for reference time + P1 (P1>0), or Uninitialized analysis product for reference time (P1=0). or Image product for reference time (P1=0)
1	Initialized analysis product for reference time (P1=0).
2	Product with a valid time ranging between reference time + P1 and reference time + P2
3	Average (reference time + P1 to reference time + P2)
4	Accumulation (reference time + P1 to reference time + P2) product considered valid at reference time + P2
5	Difference (reference time + P2 minus reference time + P1) product considered valid at reference time + P2
6	Average (reference time - P1 to reference time - P2)
7	Average (reference time - P1 to reference time + P2)
8-9	reserved

TABLE 5.
TIME RANGE INDICATOR
(PDS Octet 21)

VALUE	MEANING
10	P1 occupies octets 19 and 20; product valid at reference time + P1
11-50	reserved
51	Climatological Mean Value: multiple year averages of quantities which are themselves means over some period of time (P2) less than a year. The reference time (R) indicates the date and time of the start of a period of time, given by R to R + P2, over which a mean is formed; N indicates the number of such period-means that are averaged together to form the climatological value, assuming that the N period-mean fields are separated by one year. The reference time indicates the start of the N-year climatology. N is given in octets 22-23 of the PDS. If P1 = 0 then the data averaged in the basic interval P2 are assumed to be continuous, i.e., all available data are simply averaged together. If P1 = 1 (the units of time - octet 18, code table 4 - are not relevant here) then the data averaged together in the basic interval P2 are valid only at the time (hour, minute) given in the reference time, for all the days included in the P2 period. The units of P2 are given by the contents of octet 18 and Table 4.
52-112	reserved
113	Average of N forecasts (or initialized analyses); each product has forecast period of P1 (P1=0 for initialized analyses); products have reference times at intervals of P2, beginning at the given reference time.
114	Accumulation of N forecasts (or initialized analyses); each product has forecast period of P1 (P1=0 for initialized analyses); products have reference times at intervals of P2, beginning at the given reference time.
115	Average of N forecasts, all with the same reference time; the first has a forecast period of P1, the remaining forecasts follow at intervals of P2.

TABLE 5.
TIME RANGE INDICATOR
(PDS Octet 21)

VALUE	MEANING
116	Accumulation of N forecasts, all with the same reference time; the first has a forecast period of P1, the remaining follow at intervals of P2.
117	Average of N forecasts, the first has a period of P1, the subsequent ones have forecast periods reduced from the previous one by an interval of P2; the reference time for the first is given in octets 13-17, the subsequent ones have reference times increased from the previous one by an interval of P2. Thus all the forecasts have the same valid time, given by the initial reference time + P1.
118	Temporal variance, or covariance, of N initialized analyses; each product has forecast period P1=0; products have reference times at intervals of P2, beginning at the given reference time.
119	Standard deviation of N forecasts, all with the same reference time with respect to time average of forecasts; the first forecast has a forecast period of P1, the remaining forecasts follow at intervals of P2.
120 -122	Reserved
123	Average of N uninitialized analyses, starting at the reference time, at intervals of P2.
124	Accumulation of N uninitialized analyses, starting at the reference time, at intervals of P2.
125-254	Reserved

TABLE 5.
TIME RANGE INDICATOR
(PDS Octet 21)

VALUE	MEANING

NOTES:

1) For analysis products, or the first of a series of analysis products, the reference time (octets 13 to 17) indicates the valid time.

2) For forecast products, or the first of a series of forecast products, the reference time indicates the valid time of the analysis upon which the (first) forecast is based.

3) Initialized analysis products are allocated numbers distinct from those allocated to uninitialized analysis products.

4) A value of 10 allows the period of a forecast to be extended over two octets; this accommodates extended range forecasts.

5) Where products or a series of products are averaged or accumulated, the number involved is to be represented in octets 22-23 of Section 1, while any number missing is to be represented in octet 24.

6) Forecasts of the accumulation or difference of some quantity (e.g. quantitative precipitation forecasts), indicated by values of 4 or 5 in octet 21, have a product valid time given by the reference time + P2; the period of accumulation, or difference, can be calculated as P2 - P1.

A few examples may help to clarify the use of Table 5:

For analysis products P1 is zero and the time range indicator is also zero; for initialized products (sometimes called "zero hour forecasts") P1 is zero, but octet 21 is set to 1.

For forecasts, typically, P1 contains the number of hours of the forecast (the unit indicator given in octet 18 would be 1) and octet 21 contains a zero.

Value 51 allows for the identification of the most common climatological entities. With P1=0, it could represent (or identify) the multiple year climatology of anything from daily means (or less) to semi-annual means (or more, up to a full year). The assumption is that all the available values within the basic period P2 are averaged together. (An "annual mean climatology" would just be an average over the total climatological period - Table 5, entry 3.) P1=1 allows for a diurnal sub-stratification of the data within the P2 period, such as 30-year climatology of February mean 00Z temperature starting at a date certain, or all the 12Z surface radiation fluxes averaged for all the days in a season, or whatever. If other sub-stratifications are appropriate they could be identified by different values of P1. Value 115 would be used, typically, for multiple day mean forecasts, all derived from the same initial conditions.

Value 117 would be used, typically, for Monte Carlo type calculations: many forecasts valid at the same time from different initial (reference) times.

Averages, accumulations, and differences get a somewhat specialized treatment. If octet 21 (Table 5) has a value between 2 and 5 (inclusive) then the reference time + P1 is the initial date/time and the reference time + P2 is the final date/time of the period over which averaging or accumulation takes place. If, however, octet 21 has a value of 113, 114, 115, 116, 117, 118, 123, or 124 then P2 specifies the time interval between each of the fields (or the forecast initial times) that have been averaged or accumulated. These latter values of octet 21 require the quantities averaged to be equally separated in time; the former values, 3 and 4 in particular, allow for irregular or unspecified intervals of time between the fields that are averaged or accumulated.